Low Power Compact Ka-BUC

Installation and Operation Manual

IM02960202 Rev.B

Agilis

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Table of Contents

Chapter 1 Product Overview 1
1.1 About The BUC 1
1.2 BUC Functions 2
1.2.1 BUC Functional Block Diagram 3
1.2.2 Transmit Frequency Bands 3
1.3 BUC Interfaces 4
1.3.1 BUC Front View 4
1.3.2 BUC Top View 6
1.3.3 BUC Rear View 6
1.4 Product Models 7

Chapter 2 System Configuration 9
2.1 System Configuration 9
2.1.1 Stand-Alone System Configuration 9
2.2 System Components 11
2.2.1 Power Supply Unit 11
2.2.2 Transient Protection Box 11

Chapter 3 Installation 13
3.1 Unpacking the Box 13
3.2 Pre-Installation Preparations 14
3.2.1 Environmental Considerations 14
3.2.2 Tools Required 14
3.2.3 Site Preparation Checklist 14
3.2.4 Pre-Installation Test 16
3.3 Installing the BUC & Other Components 17

Chapter 4 BUC Setup and Management 21
4.1 Monitor & Control 21
4.2 Using the Agilis EMS Software 21
4.2.1 Connecting the PC to the BUC 21
4.2.2 Installing the Agilis EMS Software 22
4.2.3 Launching the Agilis EMS Software 23
4.2.4 Main User Interface 23
4.2.5 Types of Users 24
4.2.6 Selecting the Device to Manage 24
4.2.7 Modifying Configuration Parameters 28

Chapter 5 Maintenance & Troubleshooting 31
5.1 Preventive Maintenance 31
5.1.1 Fans Maintenance 31
5.1.2 Gains Testing 32
5.1.3 Completing the Maintenance 33
5.2 Understanding Faults in the BUC 34
5.3 Understanding Faults in Remote Management 35

Appendix A Customer Service 37
A.1 Warranty Information 37
A.2 Return Material Authorization (RMA) 38
A.3 Additional Technical Support 40

Appendix B Unit Specifications & Outline 41
B.1 System Specification Tables 41
B.2 Power Supply Unit (PSU) 43
B.3 Unit Outline Drawings 44

Appendix C Compliance Standards 47

Appendix D Document Revision Log 49

List of Figures

Figure 1.1 BUC functional block diagram 3
Figure 1.2 Front view of the 4W-5W Ka-BUC 4
Figure 1.3 Front view of the 8W Ka-BUC 4
Figure 1.4 Top view of the 4W-5W Ka-BUC 6
Figure 1.5 Rear view of the 8W Ka-BUC 6
Figure 2.1 BUC Stand-Alone System Configuration 9
Figure 2.2 Transient Protection Box 11
Figure 3.1 Connection for uplink test procedure 16
Figure 3.2 Typical mounting for the Low Power Compact Ka-BUC 17
Figure 3.3 Sealing the connectors 19
Figure 4.1 Connecting PC to the BUC 21
Figure 4.2 AgilisEMS.exe icon 22
Figure 4.3 Agilis EMS Main User Interface 23
Figure 4.4 Configuration button 28
Figure 4.5 Band Select Configuration 29
Figure B-1 4W – 5W Ka-BUC outline drawing 44
Figure B-2 8W Ka-BUC outline drawing 45

List of Tables

Table 1-1 BUC Transmit Frequency Bands for Ka-band 3

Table 1-2 Interfaces present on the front panel of the BUC 4

Table 1-3 M&C connector pin-out configuration 5

Table 1-4 Interface present on the rear of the BUC 6

Table 1-5 Interface present on the rear of the BUC 6

Table 1-6 Product series models 7

Table 2-1 Details of Cables used in Stand-Alone Configuration 10

Table 4-1 Cable pin-out configuration 21

Table 4-2 Types of Users 24

Table 4-3 Band Select Frequencies 28

Table 5-1 AC power tolerance 32

Table 5-2 Troubleshooting faults in the BUC 34

Table 5-3 Troubleshooting errors in remote management using EMS 35

Table A-1 Pre-RMA Request Checklist 38

Table B-1 BUC specification tables 41

Table B-2 PSU specification tables 43

Chapter 1 Product Overview

Agilis, a global leader in the design, development and manufacturing of quality satellite products for various applications, introduces the Low Power Compact Ka-Band Block-Up Converter (BUC).

The Low Power Compact Ka-Band BUC is a highly reliable and cost effective outdoor RF transmitter ideal for mobile and satellite uplink applications. It is suitable for both telephony and high speed data communication.

The BUC is easy to install and configure. Small and lightweight, the Ka-Band BUC is designed to be directly mounted on the feed horn. Its innovative and efficient thermal design makes it one of the smallest, lightest and most reliable in the industry.

This user manual provides detailed information to system integrators and end users on how to set-up, operate and maintain the Low Power Compact Ka-Band BUC.

1.1 About The BUC

The Compact Ka-BUC can be operated with different modulation formats such as BPSK, QPSK and FM. Due to the stringent performance specifications; it is suitable for the following applications:

- Single Carrier Per Channel (SCPC)
- Multi-Carrier Per Channel (MCPC)
- Demand Assigned Multiple Access (DAMA)
- Time Division Multiple Access (TDMA)

Base band signals are modulated onto L-band frequency and multiplexed with 10 MHz or 50 MHz reference; depending on the model part number, on the IF cable's centre conductor. It is then up converted and amplified in the Ka-BUC for transmission to the satellite via an antenna dish. The Compact Ka-BUC is designed with low DC power consumption, well suited for applications and systems where power is an important concern. With low pulse mode phase perturbation, it is extremely useful for systems that require burst mode applications.

The transmit output waveguide is WR28 grooved. A yellow transparent tape is laminated onto the waveguide and an O-ring is provided to prevent water ingress through the waveguide.

🕮 Note: Do not remove the yellow transparent tape because it is meant to be permanently laminated at the waveguide transmit output.

1.2 BUC Functions

The main function of the BUC is to up convert L-band input signals from an indoor modem to a Ka-Band signal for transmission via the antenna.

The BUC includes the following function modules:

- Cooling sub-system

  The cooling system consists of heat sink and fans and uses forced-air convection cooling. All RF modules are placed on a heat sink for effective heat dissipation. High power devices are cooled by inbuilt fans which operate on DC power generated internally by the power supply unit.

  🕮 Note: Please keep the BUC fans at least 6" away from any obstruction to allow for air circulation through the fans.

  An over-temperature switch monitors the internal temperature of the unit. When the temperature exceeds acceptable operating limits, the SSPA module is automatically disabled, minimizing damage to the power devices.

- Solid state power amplifier

  Each BUC has an internal SSPA module. The BUC feeds up-converted signals into an internal SSPA module to be amplified for transmission to the satellite via the antenna. The SSPA uses high power FETs to generate the required output power. The SSPA operates on DC power internally generated by the internal power supply unit.

- Monitor and control

  The M&C module is the central processing hub of the Ka-BUC. It is developed on an embedded microcontroller to perform the required monitoring and control functions. Remote I/O interface and the 48V power supply are provided to the BUC through a single connector. The unit can be connected to a remote PC via serial communication using RS422. Using the M&C module, you can:

  - Control the BUC
  - Configure BUC attenuation
  - Configure BUC for redundancy
  - Enable/Disable RF output power
  - Configure the Band Select Filter
  - Monitor RF (RF output power and temperature) and electrical readings.
  - Check alarm status

- Power supply

  The Ka-BUC requires a 24V DC (range 18V DC to 50V DC). This DC power is fed into the Ka-BUC via an external power supply. The Ka-BUC has an in-built Power Supply Unit (PSU) that converts DC power received to the suitable voltages required by the various other modules and fans. The power supply is compact, reliable and has adequate consideration for safety, EMC and EMI.

WARNING: The Ka-BUC is automatically powered on when DC power is applied. To avoid damaging the BUC, do not connect the entire setup to the primary AC power source until all connections have been made.

1.2.1 BUC Functional Block Diagram

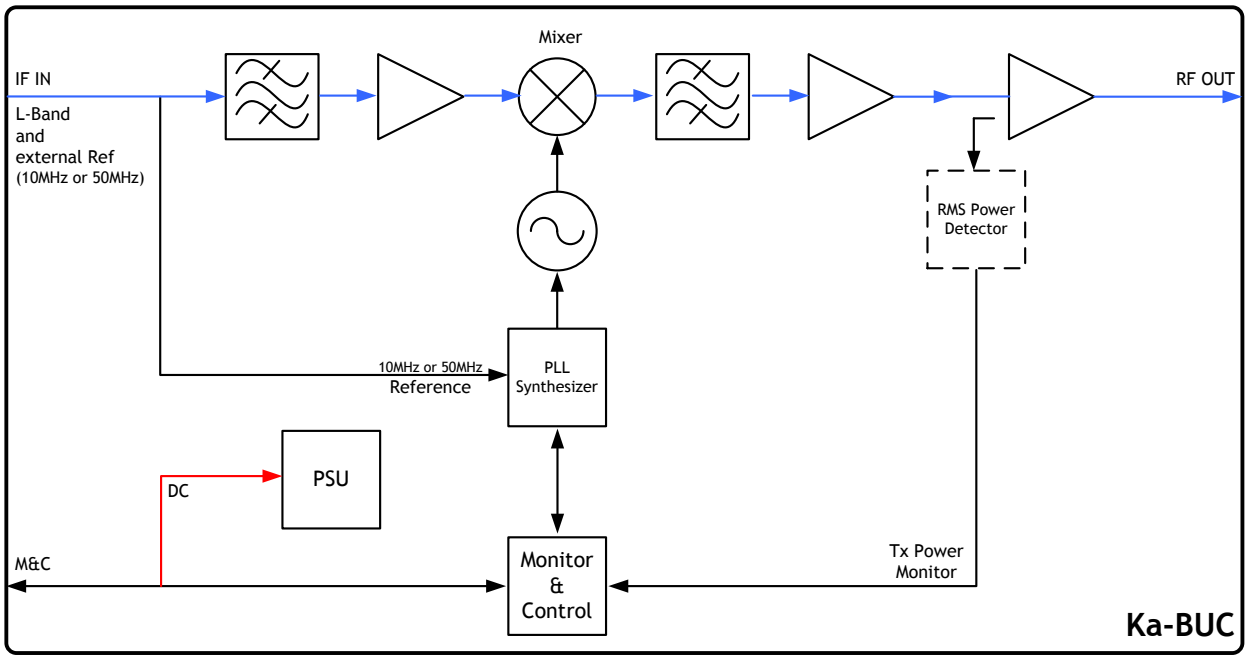

Figure 1.1 BUC functional block diagram

Note: The External Reference required by the Ka-BUC depends on the product series model number. The "**-N**" series Ka-BUC requires an external 50MHz Reference signal multiplexed with the L-Band signal via the IFL line.

1.2.2 Transmit Frequency Bands

Table 1-1 BUC Transmit Frequency Bands for Ka-band

Frequency Band	IF Frequency (MHz)	LO Frequency (GHz)	Output Frequency (GHz)
4W/8W Ka-BUC	950 – 1950	27.65	28.60 – 29.60
5W Ka-BUC		28.05	29.00 – 30.00

1.3 BUC Interfaces

All port connectors on the front, rear and top of the Ka-BUC are sealed to prevent air and moisture from entering the unit and causing damage to the internal components.

1.3.1 BUC Front View

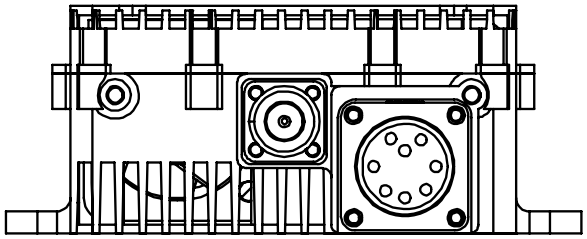

Figure 1.2 Front view of the 4W-5W Ka-BUC

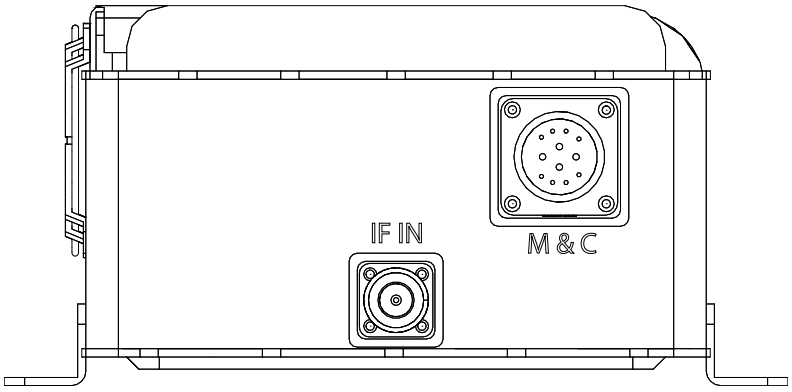

Figure 1.3 Front view of the 8W Ka-BUC

Table 1-2 Interfaces present on the front panel of the BUC

Port Reference	Connector Type	Signal Details
IF IN	50Ω N-type female.	L-band input signal with 10MHz reference or 50MHz reference for the "**-N**" series models.
M&C	12-pin circular type (PT02E-14-12P)	M&C signal and DC voltage

The table below describes the pin-out configuration for the M&C connector.

Table 1-3 M&C connector pin-out configuration

Pin #	Function	
Pin A	Tx – (RS422)	
Pin B	Tx + (RS422)	
Pin C	Band Select + (RS422)	
Pin D	Band Select – (RS422)	
Pin E	Keyline + (RS422)	PA On/Off Control
Pin F	Keyline – (RS422)	
Pin G	Rx + (RS422)	
Pin H	Rx – (RS422)	
Pin J	DC +	
Pin K	DC - (Return)	
Pin L	Spare	
Pin M	Spare	

1.3.2 BUC Top View

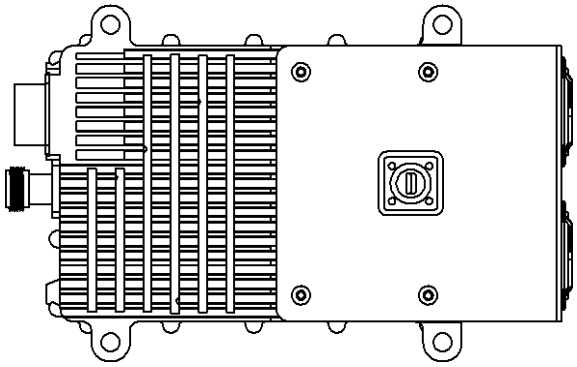

Figure 1.4 Top view of the 4W-5W Ka-BUC

Table 1-4 Interface present on the rear of the BUC

Port Reference	Connector Type	Signal Details
RF OUT	WR-28 grooved	Amplified RF signal

1.3.3 BUC Rear View

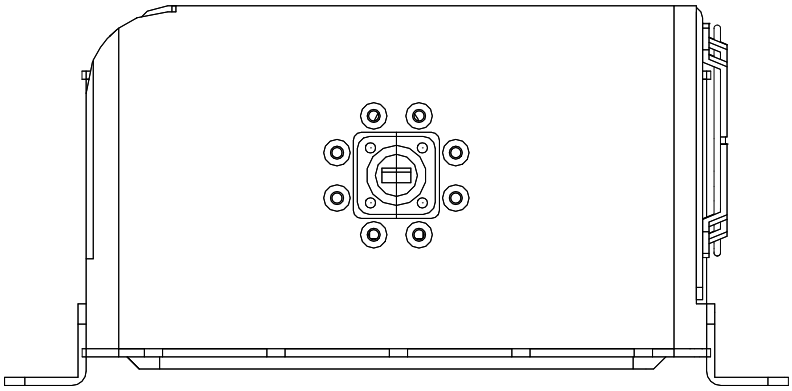

Figure 1.5 Rear view of the 8W Ka-BUC

Table 1-5 Interface present on the rear of the BUC

Port Reference	Connector Type	Signal Details
RF OUT	WR-28 grooved	Amplified RF signal

1.4 Product Models

This manual is suitable for the following Low Power Ka-BUC models:

Table 1-6 Product series models

Model Type	Model Part Number
4W Ka-Band BUC	ALB110AEM-4B
4W Ka-Band BUC	ALBX10XXX-4X-X
5W Ka-Band BUC	ALB110AEM-5B-N
5W Ka-Band BUC	ALBX10XXX-5X-X
8W Ka-Band BUC	ALB110AEM-8B
8W Ka-Band BUC	ALBX10XXX-8X-X

🕮 **Note:** External Reference 50MHz for the "**-N**" series models.

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Chapter 2 System Configuration

This chapter explains, in detail, the system in which the BUC is deployed in and its various components.

2.1 System Configuration

The Ka-Band BUC can be deployed in a stand-alone configuration. The stand-alone system configuration setup and its components are discussed below.

2.1.1 Stand-Alone System Configuration

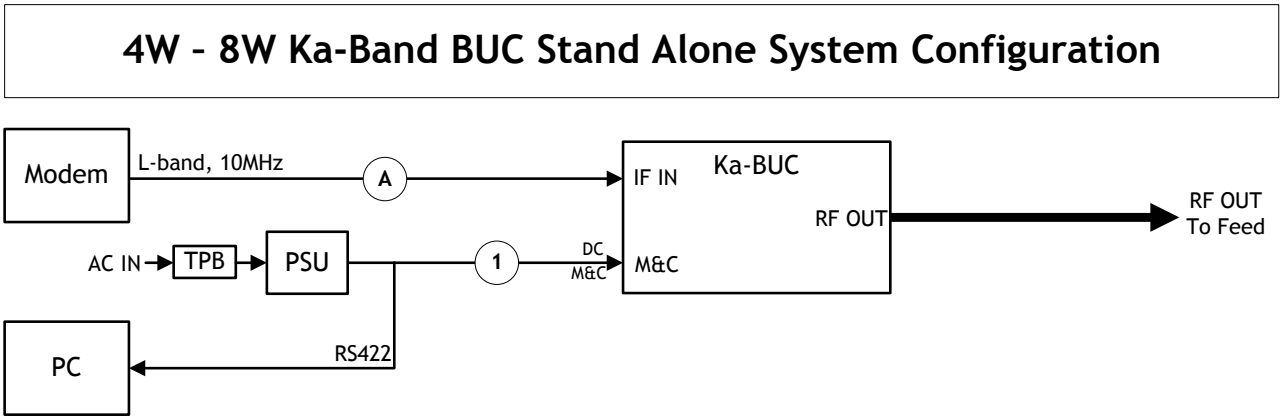

Figure 2.1 BUC Stand-Alone System Configuration

🕮 Note: The PSU and TPB are optional items.

🕮 Note: This table lists the typical accessories required for the connection. Please contact Agilis for purchase of any of these accessories if needed.

Table 2-1 Details of Cables used in Stand-Alone Configuration

Item	Agilis Part No.	Description	Length (m)	Quantity
1	2502041458	C/A S/PLUG 14-12S TO M&C DB9 & DC OPEN	-	1
A	-	RF cable (L-Band)	To be arranged by the customer	
-	ALB110XXXXX	Ka-BUC	-	1
-	6401240110	O-RING SILICON ID 10.5mm X 1.8mm	-	1
-	6302300310	SCRW HEX SCKT HD SS M3 x 10mm	-	4
-	APSVAC48-X00	AC-DC Power Supply Unit (optional)	-	-
-	1001520980	AC power cable with transient protection box (optional)	2	-
-	IM02960202	Installation and Operation Manual	-	1

🕮 Note: If your purchase includes the PSU, you will be provided with the connecterized Y-cable. Otherwise, the open end cable will be provided instead (P/N: 2502041458).

2.2 System Components

This section explains the various system components, aside from the BUC unit, that is required to setup the entire system.

2.2.1 Power Supply Unit

The Agilis APS series Power Supply Unit (PSU) is a compact and highly reliable standard switching power supply for Agilis BUC products. The PSU receives AC power from a standard AC power source (110V to 230V) and converts it into DC power to be fed into the BUC.

🕮 Note: The PSU is an optional item.

Each PSU is equipped with 2 ports, DC OUT and AC IN. Each port is explained in the table below.

Port Reference	Connector Type	Signal Details
DC OUT	Amphenol 62IN-12E-12-4S	DC voltage to BUC
AC IN	KPSE02E12-3P	For connection to 230VAC or 110VAC using the Agilis' AC power cable.

2.2.2 Transient Protection Box

Transient protection prevents spikes in electrical discharges that may cause damage to the RCU or other connected components. A TPB is connected to both AC input ports of the RCU.

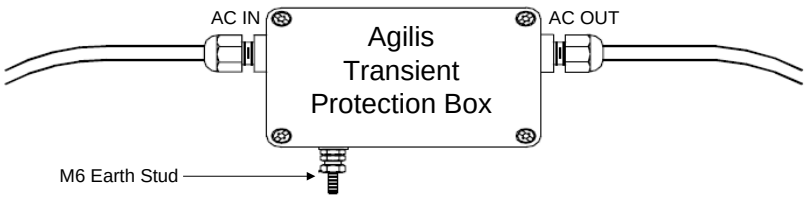

Figure 2.2 Transient Protection Box

🕮 Note: The TPB is an optional item.

For the TPB to work effectively, please keep clean outgoing lines away from the incoming or earth leads.

🕮 Note: Ground the TPB by connecting the M6 Earth Stud to a grounding rod. Note that this is vital to the proper operation of the TPB.

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Chapter 3 Installation

This chapter explains a step-by-step process to safely mount and install your Agilis product.

WARNING: Always handle the Ka-BUC with care. Dropping or knocking it may cause damage to the unit. Agilis' warranty does not extend to defects due to excessive shock or vibration.

Do not operate the Ka-BUC without a cable or a RF load connected to the RF OUTPUT waveguide port. The load should be at least double the BUC wattage.

3.1 Unpacking the Box

Before unpacking the box, check if it had been damaged or opened. If the shipment may have been tempered with, open the box in front of a representative from the shipping company.

Upon opening the box, carefully remove the items in the package and check them against the packing list. If any of the items are damaged or missing, please contact Agilis or your local Agilis representative before proceeding.

We recommend that you keep the original packing materials until you have completed the checks and confirmed that the unit is in working order.

If you need to repack the product for shipping, please use the original shipping container and packing materials whenever possible. Alternatively, you may also use high quality commercial packing materials to repack the unit. Please seal the container firmly and clearly mark **"FRAGILE Electronic Equipment"** on the exterior.

3.2 Pre-Installation Preparations

3.2.1 Environmental Considerations

The Ka-BUC is a weatherproof, outdoor unit mounted directly onto the orthogonal mount transducer (OMT) of the antenna. This design allows the transmitter (power amplifier) to be installed close to the transmitter antenna. The unit's aluminium chassis is coated with white, enamelled epoxy for environmental protection. All interface connectors are sealed to prevent air and moisture from entering the unit.

Before proceeding with the mounting process, please ensure that the environmental conditions in the area where the BUC is to be mounted is appropriate for its optimal operation. These include:

- Temperature: -40ºC to +60ºC
- Relative Humidity: 0 to 100% condensing (rain, snow, ice etc.)
- Altitude: Up to 10,000 feet (3048m) ASL
- Solar Radiation: 360 BTU/hr/ft^2 (1135 W/m^2)
- Shock and Vibration: As encountered in a typical outdoor earth station environment not in an earthquake zone

3.2.2 Tools Required

We highly recommend having the following tools on hand before starting the installation:

- 1 complete set of socket wrench
- 1 Philips head screwdriver
- 1 cutter
- 1 bag of cable ties (long and Low length)
- 1 multimeter

3.2.3 Site Preparation Checklist

The following table provides a checklist to help you ensure that your site is adequately equipped to perform the installation.

Checklist Item	Y/N
Equipment required for site survey	☐ Inclinometer ☐ Compass / DataScope ☐ 1-meter rectangular bar ☐ Scientific calculator ☐ 100-meter measuring tape ☐ Site location map ☐ GPS receiver ☐ Road distance wheel ☐ Vernier calliper ☐ Location markers / flags
Is site in the satellite footprint?	☐ Yes ☐ No

Checklist Item	Y/N
Approximate length of cables between ODU and IDU	
IF cable routing method	☐ Underground ☐ Surface
Is there a clear path for cables from ODU to IDU?	☐ Yes ☐ No
Proposed mounting location	☐ Antenna structure ☐ Near the antenna ☐ Inside the shelter ☐ Other: _____
Does the mounting location provide the best route for cables from IDU to ODU to antenna?	☐ Yes ☐ No
Is there an unobstructed view from the satellite(s) of interest?	☐ Yes ☐ No
Are there any hazards near the site location that may damage or obstruct the ODU? (old buildings, trees, planned future construction)	☐ Yes ☐ No If yes, please specify: _____
Are there possible RF interference from other nearby telecommunication towers?	☐ Yes ☐ No
Will your installation cause interference to other nearby setup?	☐ Yes ☐ No
Is sufficient power supply available?	☐ Yes ☐ No
Is grounding available?	☐ Yes ☐ No
Is the site prone to the following?	☐ Heavy wind ☐ Heavy rainfall ☐ Ice/snow accumulation ☐ Extreme temperatures ☐ Sand/Dust storms ☐ Others: _____

3.2.4 Pre-Installation Test

Performing a pre-installation test prior to the actual field installation helps you to:

- Confirm that the unit has not been damaged during shipment.
- Check that the unit is in working order before performing a tiring and costly mounting procedure on your antenna.

🕮 Note: Ensure that no alarm or fault appears on the Compact Ka-BUC before performing any test.

🕮 Note: To avoid damaging the Ka-BUC, please connect a 40 dB waveguide attenuator or coupler with a power rating that is at least twice the rated RF output of your BUC.

Step 1 Connect the Compact Ka-BUC as shown in the figure below and power up the system.

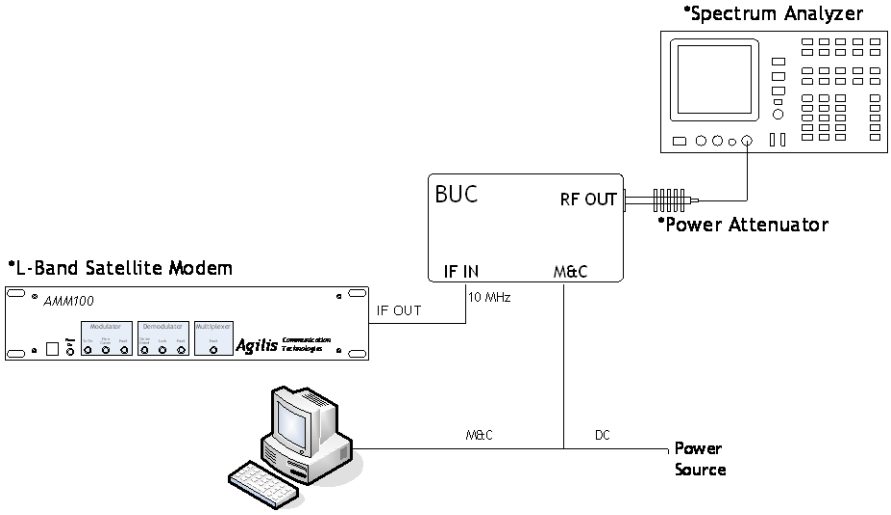

Figure 3.1 Connection for uplink test procedure

🕮 Note: * represents equipment not provided by Agilis

Step 2 Use the L-band satellite modem to input an L-band pure carrier.

Turn on the transmit carrier and set the pure carrier feature to ON.

Step 3 Adjust the modem's output power until the IF level input to Compact Ka-BUC is -50 dBm.

Step 4 Measure the RF OUT of the Compact Ka-BUC using a spectrum analyzer at Ka-band.

1. Calculate the total transmit gain based on this formula: *Output power – Input power + Amount of attenuation*.
2. Compare the result against the specifications (Appendix B Unit Specifications & Outline). If there is no signal, check that the channel setting is correct.

Step 5 Replace the spectrum analyzer with a power meter. Measure the rated power of the Compact Ka-BUC by adjusting the input level of the L-band satellite modem.

Compare the result against the specifications (Appendix B Unit Specifications & Outline). If there is no signal, check that the channel setting is correct.

3.3 Installing the BUC & Other Components

Step 1 All Agilis components in this system are outdoor mounted equipments designed to withstand most weather conditions. Mount the BUC onto the antenna OMT.

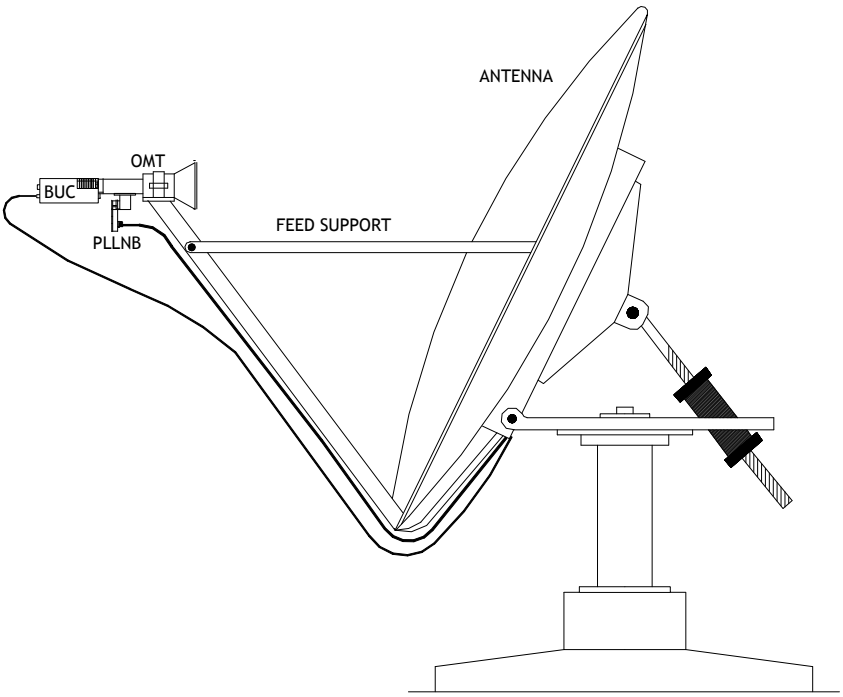

Figure 3.2 Typical mounting for the Low Power Compact Ka-BUC

Step 2 Connecting the BUC

The following connections need to be performed if you are setting up the BUC in a standalone system configuration.

1. Connect the IF IN port of the BUC to an indoor modem using a standard IF coaxial cable.
2. Connect the M&C port of the BUC to an indoor terminal (such as a PC) for monitoring purposes using the Y cable provided.
3. Connect the third end of the Y cable to a DC supply.

Step 3 Grounding the installation

This process provides a conductive path for static electrical charges to be discharged safely from the equipment to the ground. This prevents a build up of static charges that may cause the equipment to spark.

1. Locate an appropriate grounding spot. Most soil has sufficient conductivity to allow for an efficient grounding connection. Soils that are mainly rock may need to be treated with additional minerals like rock salt, copper sulphate or magnesium sulphate to increase their conductivity.
2. Drive a 3m lightning rod into the ground about 30cm from the antenna pole. Bolt an aluminium wire, minimum 9mm in diameter, to the ground pole. A tight clamp is used to make contact at the top end. Avoid sharp bends when routing the wire as these may impede current flow.

🕮 Note: Grounding resistance of the antenna should be no more than 10Ω.

WARNING: Please ensure that the wire is tightly connected between the rod and the equipment to prevent sparks.

Step 4 Switch on the unit

WARNING: Please ensure that the AC power source is off before connecting any devices to AC.

FOR STAND ALONE SYSTEMS

Connect the PSU to an appropriate AC power source (110V or 230V). Ensure that all connections have been completed before turning on the power supply.

The BUC will automatically power on when an appropriate DC current is fed into the unit.

Step 5 Sealing the cables

To complete the physical installation, all connectors and important joints in the system must be sealed. Note that the sealing must begin from the chassis of the ODUs up to the heatshrink of the cable.

All unused connections must be sealed to prevent water ingress. Waveguide joints must be equipped with an appropriate gasket. Please ensure that all connectors are hand tightened before sealing.

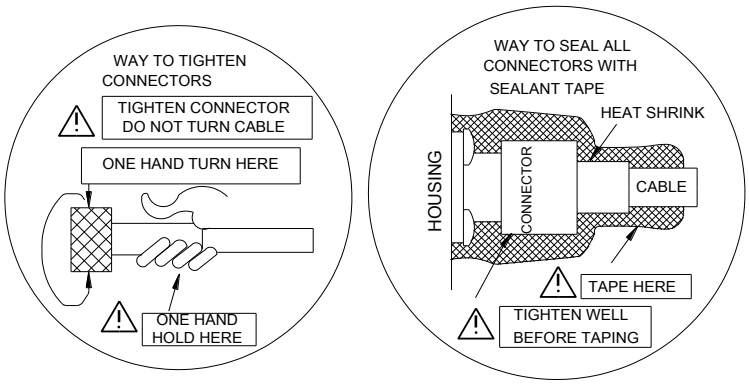

Figure 3.3 Sealing the connectors

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Chapter 4 BUC Setup and Management

4.1 Monitor & Control

Agilis devices can be monitored and controlled remotely via the Agilis EMS Software.

This chapter looks at how you can set up and manage your BUC system using the Agilis EMS Software.

4.2 Using the Agilis EMS Software

The Agilis EMS Software is a lightweight network management software that allows the user to monitor and control the Ka-Band BUC remotely through a PC.

4.2.1 Connecting the PC to the BUC

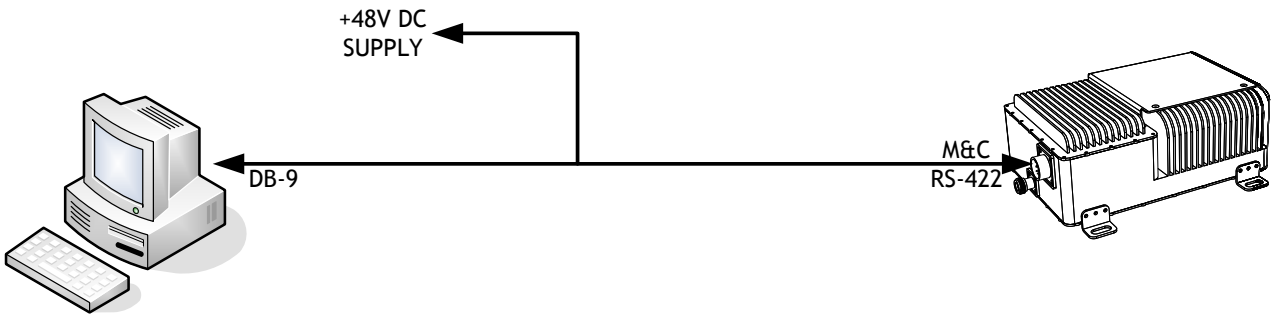


Figure 4.1 Connecting PC to the BUC

Table 4-1 Cable pin-out configuration

RS422 cable		
Male Circular	Female DB-9	Signal
Pin A	Pin 1	TxD-
Pin B	Pin 2	TxD+
Pin G	Pin 3	RxD+
Pin H	Pin 4	RxD-

4.2.2 Installing the Agilis EMS Software

The Agilis EMS software must be installed into a PC terminal to be used to monitor your Agilis devices.

MINIMUM SYSTEM REQUIREMENTS

- Windows XP / Windows 7 operating system
- At least 1GB Hard Disk free space
- 2GB RAM (Recommended)
- A M&C serial interface

SOFTWARE INSTALLATION

🕮 Note: For detailed information on the Agilis EMS Software, refer to IM02960173 Agilis EMS Software Installation and Operation Manual.

Step 1 If an Agilis EMS installation CD is included in your package, please insert the CD into your PC's disc drive and unzip the setup file.

Step 2 Launch the setup file

Locate the setup file and double click the file to start the setup.

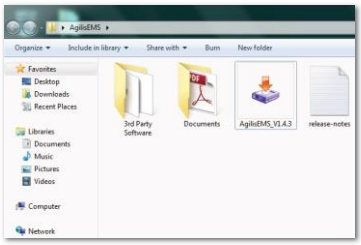


Figure 4.2 AgilisEMS.exe icon

Step 3 Follow the step-by-step installation instructions to install the software.

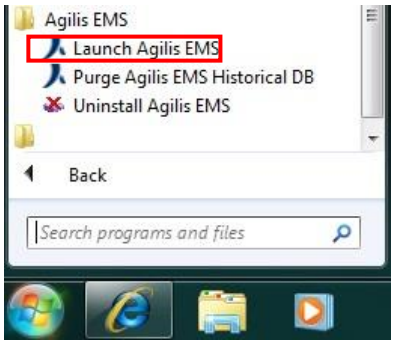
🕮 Note: You must have administrator permission on your Windows PC to install the software.

Step 4 Install the Flash player, Java applet, and the mysql ODBC software inside the 3rd Party Software folder.

🕮 Note: The 3rd party software must be installed before launching the EMS application; otherwise, the EMS software will not be able to establish communication with the BUC.

4.2.3 Launching the Agilis EMS Software

To Launch the Agilis EMS Software, click on **Start** > **All Programs** > **Agilis EMS**, click on the **Launch Agilis EMS** to start Agilis EMS.



Once all the required services are started, an Agilis icon would be displayed in the notification area usually found in the bottom right hand corner. This would indicate that the startup of services has been initiated.

An IE (Internet Explorer) window will automatically pop-up upon successful startup.

4.2.4 Main User Interface

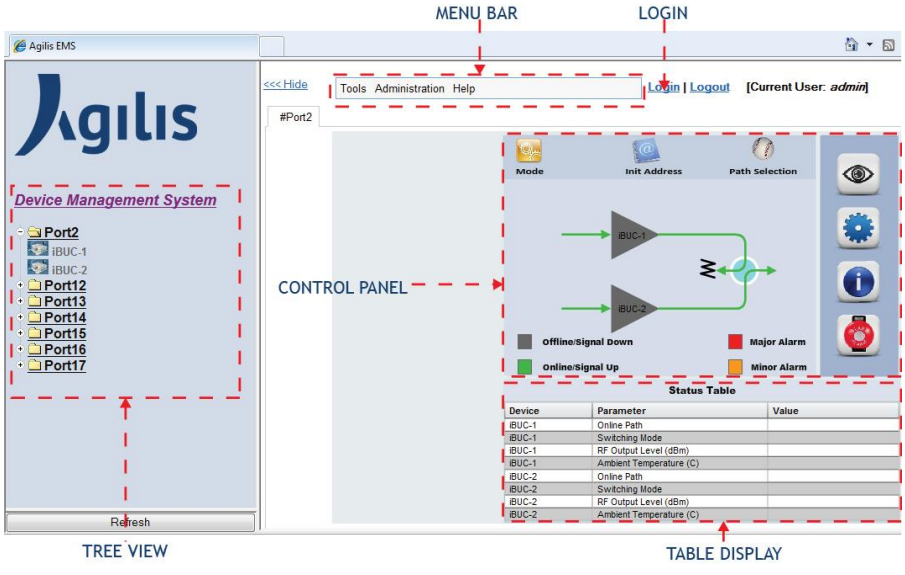


Figure 4.3 Agilis EMS Main User Interface

4.2.5 Types of Users

Table 4-2 Types of Users

User	Password	Options Available
Operator (Guest)	NA	• Analog Charts • Device Configuration
admin	admin	• Analog Charts • Device Configuration • User Management

📖 Note: It is recommended to login as an admin when configuring a device. Configuring a device using an operator account has limitations such as, the need to exit then re-launch the EMS software for the changes to take effect.

4.2.6 Selecting the Device to Manage

The Agilis EMS Software can be used to monitor and control a wide range of Agilis products (BUC, MBUC, iBUC, SSPA, LNB, RCU, AUC, SPT and OHT). The Ka-Band BUC is under the BUC (Feedmount-Integrated) category.

Before configuring a device, the user must first identify the COM Port assigned to the Agilis device. To identify the COM Port, follow these steps:

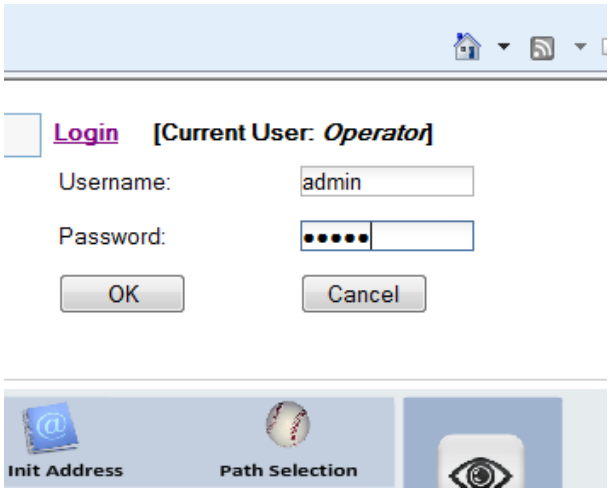
Step 1 Right click **'Computer'**, and select **'Properties'**.

Step 2 Click **'Device Manager'**.

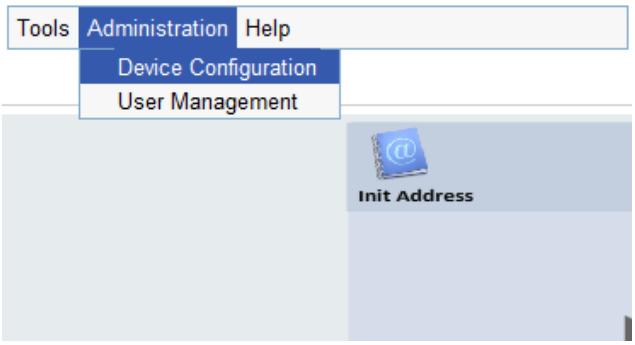
Step 3 Double-click **'Ports (COM & LPT)'** and take note of the Port number assigned to the device.

4.2.6.1 Configuring a standalone BUC

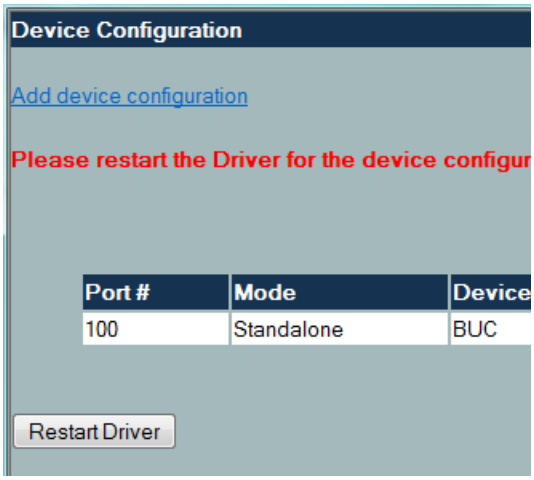
1. Login as an **'admin'**.



2. Click **'Device Configuration'** under the Administration option in the Menu Bar.



3. Click on the **'Add device configuration'** option in the Device Configuration window.



4. Under **Communication Settings**.

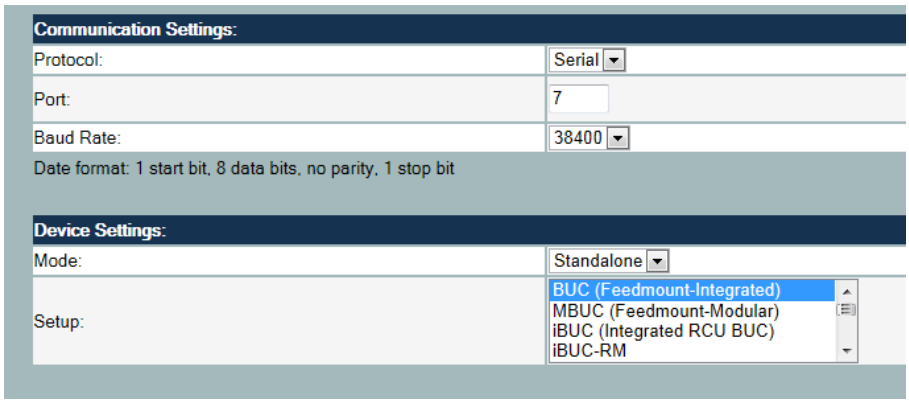
For Ka-BUC standalone configuration, the Protocol used is '**Serial**', the COM Port assigned is **7** and the Baud Rate is **38400**.

Under **Device Settings**.

For the **Mode,** select '**Standalone**'

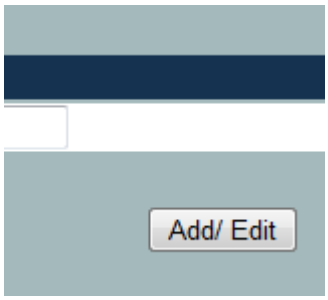
For the **Setup,** select '**BUC (Feedmount-Integrated)**'

The default '**Acronym**' will be displayed on the Acronyms table.

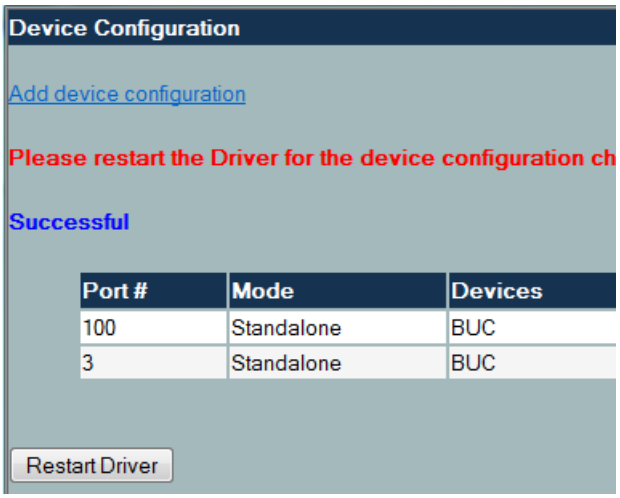


📖 Note: Please use the actual COM Port assigned to your Agilis device under the Device Manager of your PC. The Baud Rate for the Ka-BUC system configurations must be set to **38400**.

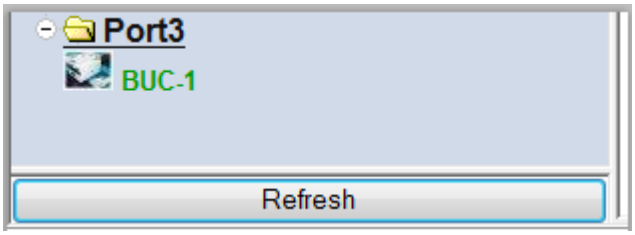
5. Click '**Add/Edit**' button.



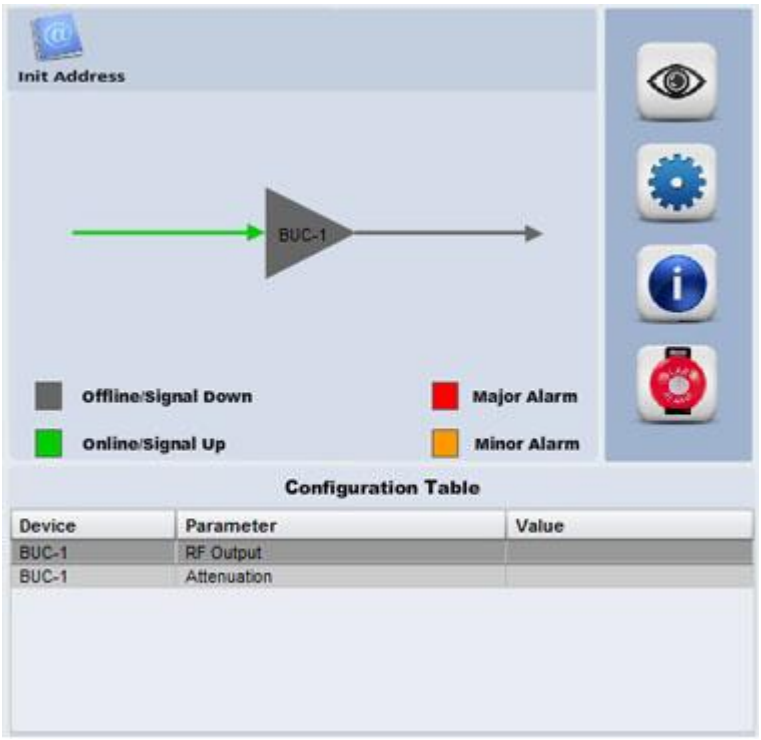
6. Click '**Restart Driver**' for the changes to take effect.



7. Click '**Refresh**' to refresh the display on the Agilis EMS main window. The Tree Menu should display the newly configured device along with the port number.



8. The block diagram of the newly configured device will be displayed on the Agilis EMS main window.



4.2.7 Modifying Configuration Parameters

Click on the '**Configuration**' icon from the control panel to SET device configuration parameters.

To change the values of the device, simply click on the boxes where the present values are being displayed. A new window would pop up for the user to enter/select the desired value. Configuration parameters are subjective to equipment type. For the Compact Ka-BUC, the configurable parameters are the **RF Output**, **Attenuation and Band**.

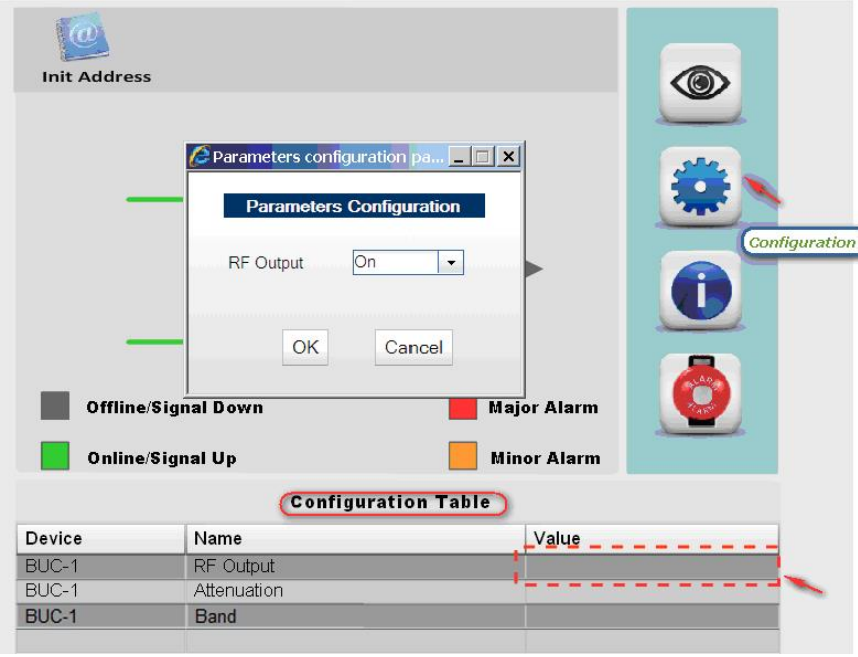


Figure 4.4 Configuration button

The Compact Ka-BUC features a Band Select Filter which allows the user to select either Low Band Input/Output or Wide Band Input/Output through the Agilis EMS Software.

Depending on product model and the RF values, the Band Select frequency options are provided in the following table.

Table 4-3 Band Select Frequencies

Band	IF	RF
LowBand	950 - 1450MHz	28.60 – 29.10GHz
		29.00 – 29.50GHz
WideBand	950 - 1950MHz	28.60 – 29.60GHz
		29.00 – 30.00GHz

When using input frequency within 950 – 1450MHz, it is recommended to select Low Band. Selecting Low Band allows the BUC to reject input harmonics, therefore reducing spurious at the output.

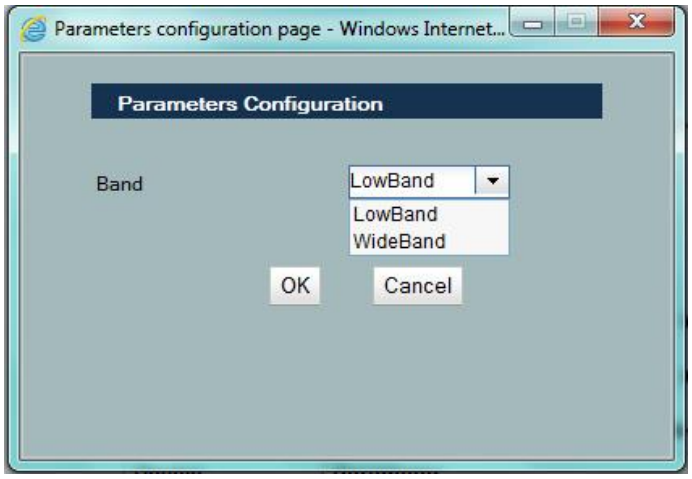


Figure 4.5 Band Select Configuration

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Chapter 5 Maintenance & Troubleshooting

This chapter details various system maintenance operations to help ensure that your system works under optimal conditions.

WARNING: Disconnect all power sources before performing any system maintenance and repair.

5.1 Preventive Maintenance

This section explains the various maintenance checks that should be routinely carried out to ensure that the system is working correctly and in optimal condition.

Ideally, you should perform a complete maintenance on the system at least twice a year and record all updates and changes made to each ODU "SETUP RECORD". Notify all users that may be affected of a system down time of roughly two hours prior to maintenance.

WARNING: Disconnect and re-connect cables during maintenance properly to avoid causing any damage to the cables that may result in intermittent problems in the future.

Connect the output interface of the equipment to a proper load.

5.1.1 Fans Maintenance

The Ka-BUC is equipped with fans at the rear or at the side of the unit. It is essential to ensure that airflow through these fans is not blocked to allow the BUC to operate at the optimal temperature. Hence, we recommend cleaning the fans at least once a year (or more depending on environmental conditions). The cleaning procedure is detailed below:

Step 1 Turn off the power supply to the Ka-BUC.

Step 2 Using compressed air, blow through the fan assembly to remove any dirt accumulation

Step 3 Turn on the power supply to the Ka-BUC.

5.1.2 Gains Testing

The test procedure is as follows:

Step 1 Look at the demodulator status (DEMODULATOR LOCK indicator on the modem) and check that is “LOCKED” to the receive signal.

Step 2 Check that the transmit and receive configurations on both the modem and the Ka-BUC complies with the SETUP RECORD. If there are any discrepancies, contact the personnel responsible for the previous record for clarifications before proceeding.

Step 3 Turn on the pure carrier of the modem and measure the power level using a spectrum analyzer.

Step 4 If your modem is connected to an AC power supply, measure the indoor AC power supply to the modem to check that the voltages are within the tolerance limits. You are recommended to use an Automatic Voltage Regulator if your power source falls outside of these limitations.

🕮 Note: The limit range will differ according to your modem’s AC voltage requirements. Please use the table as a guideline only.

Table 5-1 AC power tolerance

Tolerance	X VAC 50 Hz, where X is the AC requirement of the device
Live – Neutral	X VAC ± 15%
Live – Earth	X VAC ± 15%
Neutral – Earth	< 5 VAC

Step 5 Check that all IF and RF cables are labelled.

Step 6 Ensure that all cables are in good working condition by performing the following procedure:

1. Remove cables at both ends of the connection before taking measurements.
2. Using a mega ohm meter, measure both ends of the cables.

Step 7 Again using a mega ohm meter, measure the ground resistance of the antenna. This value should not be greater than 10Ω

Step 8 Reconnect the transmit cable to the modem and measure the power level of the pure carrier transmitted into the Ka-BUC's input port. Calculate the IFL loss and check that it is similar to the value recorded in the SETUP RECORD.

WARNING: Turn off the Ka-BUC and connect a power attenuator (30dB, >30W) to the RF OUT port of the BUC before step 8 below.

Step 9 Turn on the BUC and connect the IF IN cable. Record the RF OUT power level and calculate the uplink gain. Check that the resultant gain complies with both the SETUP RECORD and the gain setting on the BUC.

Step 10 Measure the power level and C/N_0 of the receive carrier under consideration at the BUC's RF OUT port. Check the readings against the SETUP RECORD. If there is a significant variation in the two, contact the transmit site for confirmation.

Step 11 Measure the level at the modem's IF input to determine the Rx IFL loss. Match this value against the SETUP RECORD.

5.1.3 Completing the Maintenance

Completing each maintenance service requires the following actions:

- Check the sealing on existing connections and re-seal if necessary.
- Tighten and re-seal all connections and important joints that were disconnected for maintenance.
- Check and ensure that all waveguide joints are properly equipped with a gasket and sealed.
- Cover all unused connectors with a cap and seal.
- Update the SETUP RECORD.

5.2 Understanding Faults in the BUC

The table below lists the faults that may arise in the BUC. The following information can be found in this table:

- Fault Indication: How do you tell that a fault has occurred?
- Possible Causes: What may have caused the fault and how do you check?
- Solution: How do you resolve the fault?

Table 5-2 Troubleshooting faults in the BUC

Fault Indication	Possible Causes	Solution
Fans are not working	Fans failure	Please contact Agilis for further support.
No RF output power	BUC is overheated	RF output is automatically disabled if the BUC is overheated. Allow the unit to cool to a safe operating temperature before enabling RF.
	RF is disabled (“Off”)	Check the BUC settings using the M&C software and enable RF Output (“On”).
	Internal modules failure	One or more of the internal modules, such as the power module, waveguide isolator, BUC driver and internal RF cables, have may have failed. Please contact Agilis for further support.
RF output power is low	Attenuation setting is too high	Check the attenuation setting using the M&C software and adjust accordingly.
	Gain or power is insufficient to drive the booster modules.	BUC is faulty. Please contact Agilis for further support
	Internal RF cable has high insertion loss	

5.3 Understanding Faults in Remote Management

The following table lists the errors that you may face when managing the BUC remotely via the various software methods.

Table 5-3 Troubleshooting errors in remote management using EMS

Fault Indication	Possible Causes	Solution
Agilis EMS is not starting	Installation was not done properly	Reinstall the application again as stated in this document
	Windows Firewall	Shut down the Windows Firewall service
	Port 80 is being utilized by another application	Shut down the application that is using port 80
Agilis EMS started but the flash images are not shown	Flash plug-in may be outdated	Reinstall Flash Player preferably from http://get.adobe.com/flashplayer/
Agilis EMS is not logging alarm details /analog parameters	MYSQL ODBC connecter is not installed/corrupted	Install the application from EMS CD (/3rd Party Software/mysql-connector-odbc-3.51.14-win32.exe)
PC is not showing the COM number	M&C cable driver is not installed	Install the drivers that came together with the purchased M&C cable (RS232 to USB or RS485 to USB)
M&C cable is connected and COM number is seen but still there's no communication	M&C cable could be faulty	Replace cable and try again
	Wrong M&C cable is used	Refer to the product manual and ensure that the pin configuration is correct i.e. RS232 or RS485
	For standalone mode, the address must be set to 'A'.	Start the application; click the Init Address button to set the device address to 'A'.
'Another instance of Agilis EMS is running' message is displayed when I try to start the application	Agilis EMS application is already started	Open IE and type http://localhost/agilis-ems in the URL
How do I find out the current version number?	NA	Start the application, click on Help, click on About Us
Equipment is not displaying its status properly (e.g. Status toggling online and offline in EV)	Equipment Initializing is not done	Start the application, click the Init Address button.
	Equipment Configuration could be wrong	Refer to the system manual to make sure the correct configuration is set.
RCU is not going online	The protocol might be a different version	Refer to section 1.4 for the various versions for RCU and how to replace the protocol files if necessary

Fault Indication	Possible Causes	Solution
System Slowing down	Analog and Alarm data is not cleared in the database	Purge the historical Analog and Alarm data in the database.

Appendix A Customer Service

Agilis provides a variety of after-sales services. This chapter explains some of the services offered including warranty information, the Return Material Authorization process, parts replacement etc.

A.1 Warranty Information

If the unit fails due to defects in materials or workmanship, Agilis will, at its sole discretion, repair or replace the defective parts, free of charge, within two years from the date of its shipment from the Agilis production factory.

Note that shipping cost to Agilis will not be covered under this warranty guarantee.

This warranty will be voided, freeing Agilis from any liability or obligation to the Purchaser with respect to the product in the following situations:

- The product has been damaged during shipment
- Failure caused by products not supplied by Agilis or its authorized contractors and agents.
- Failure caused by operation of the product outside of its published electrical and environmental specifications or any causes other than ordinary use.
- Water ingress due to improper installation.

A.2 Return Material Authorization (RMA)

PRE-RMA CHECKLIST

Shipping the unit to and from your supplier or the factory for repair is a costly and time consuming procedure that may cause disruption in your system for a prolonged period of time. Hence, please inspect your system thoroughly using the checklist below to help us determine if a return shipping is necessary.

Table A-1 Pre-RMA Request Checklist

Please check		
Product model / serial no:		
When did the unit fail:	☐ Initial startup ☐ Unit worked normally before failure	
Initial Fault Symptom:		
Consistent or intermittent fault	☐ Consistent ☐ Intermittent	
Duration of operation before the failure		
Are fans working normally?	☐ Yes ☐ No	
Is the airflow path blocked?	☐ Yes ☐ No	
10 MHz Ref. level at failure		
IF input level at failure		
Output power at failure		
LED status		
Is the device and setup properly grounded?	☐ Yes ☐ No	
Weather conditions just before failure	Air Temperature: _____ Heavy rain/snowfall/storms: _____	
AC Potential	Live – Neutral	
	Live – Ground	
	Neutral – Ground	
AC-DC converter working status		
Is the primary power source working and free of power spikes?	☐ Yes ☐ No	
Was there any recent power outages that affected the device?	☐ Yes ☐ No	

Please check	
Are connectors properly sealed and free from debris/water?	☐ Yes ☐ No
Replace the device with a working one (if available) and check if the system works.	☐ Works with the new device ☐ Does not work with the new device
Detail the diagnosis performed that localized the fault to the unit as the point of failure	

If you need to return the devices or any components to Agilis for repair, please contact Agilis to obtain a Return Material Authorization (RMA) number by filling in our RMA Request form. You can obtain this form via our website at www.agilissatcom.com. Once you receive a RMA number, carefully repack the unit and attach this number to the unit to be shipped to Agilis.

Agilis provides repair services for products under or out of warranty.

A.3 Additional Technical Support

If you require further technical support, please contact Agilis using the contact information below:

Address:	ST Electronics (Satcom & Sensor Systems) Pte Ltd. 6 Ang Mo Kio Electronics Park Road Singapore 567711
Service Hotline:	(+65) 6521 7959
Fax:	(+65) 6521 7333
Email:	techsvc_satcoms@stee.stengg.com

You can also visit www.agilissatcom.com for the addresses and contact information of our regional service centres.

Appendix B Unit Specifications & Outline

B.1 System Specification Tables

Table B-1 BUC specification tables

RF Specifications				
		4W	5W	8W
Transmit Frequency		28.60 – 29.60 GHz	29.0 - 30.0 GHz	28.60 – 29.60 GHz
IF Frequency Range		950 – 1950 MHz		
LO Frequency		27.65 GHz	28.05 GHz	27.65 GHz
Output Power@P1db		36dBm	37dBm	39dBm
Small Signal Gain		62dB typ	62dB typ	70dB typ
Gain Flatness		± 1.5dB 500MHz BW		
Gain Variation		± 2 dB over the operating temperature range		
Phase Noise @ offset	1kHz	-75 dBc/Hz max		
	10kHz	-81 dBc/Hz max		
	100kHz	-95 dBc/Hz max		
Input VSWR		1.5:1		
Output VSWR		2.0:1		

DC Power			
	4W	5W	8W
Primary Power	24VDC (range 18V to 50VDC)		
Power Consumption	60W (typ)	80W (max)	100W (typ)

Interfaces	
IF Input Interface	50Ω N-Type Female
Output Interface	WR28 grooved

External Reference Requirement		
Frequency		10MHz
		50MHz for the "**-N**" series models
Power		-5 to +5 dBm -7 to +5 dBm (for 5W Ka-BUC)
External reference phase noise requirement @ frequency offset	1kHz	-130 dBc/Hz
	10kHz	-155 dBc/Hz
	100kHz	-160 dBc/Hz

Environmental	
Operating Temperature	-40°C to +60°C
Relative Humidity	Up to 100% Weather protection sealed to IP65

Mechanical Specifications		
	4W / 5W	8W
Dimensions (LxWxH) (mm)	186 x 100 x 51	232 x 152 x 89
Weight	1.6kg	4.2kg
Color	White Powder Coat	

B.2 Power Supply Unit (PSU)

Table B-2 PSU specification tables

DC Specifications	
Output Voltage	48V DC typ
Output Power	350W
AC Mains Input Voltage	110V to 230V AC
AC Mains Input Frequency	47 to 63 Hz
Protection	Overcurrent / Overvoltage

Environmental Specifications	
Operating Temperature	-40°C to +60°C
Relative Humidity	Up to 100%

Mechanical Specifications	
Dimensions LxWxH	190 x 189 x 107 mm
Weight	3kg
Color	White Powder Coat

B.3 Unit Outline Drawings

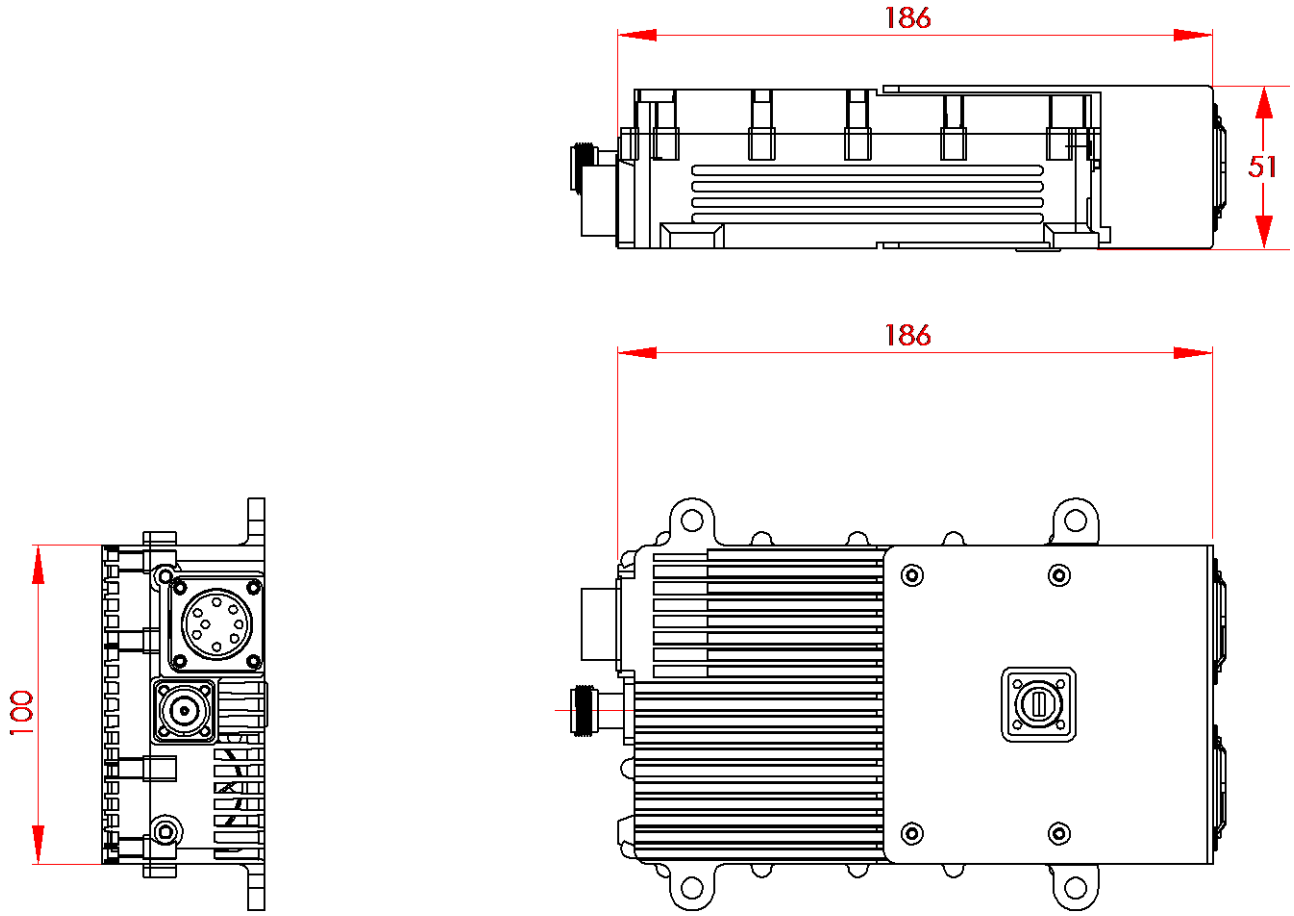

Figure B-1 4W – 5W Ka-BUC outline drawing

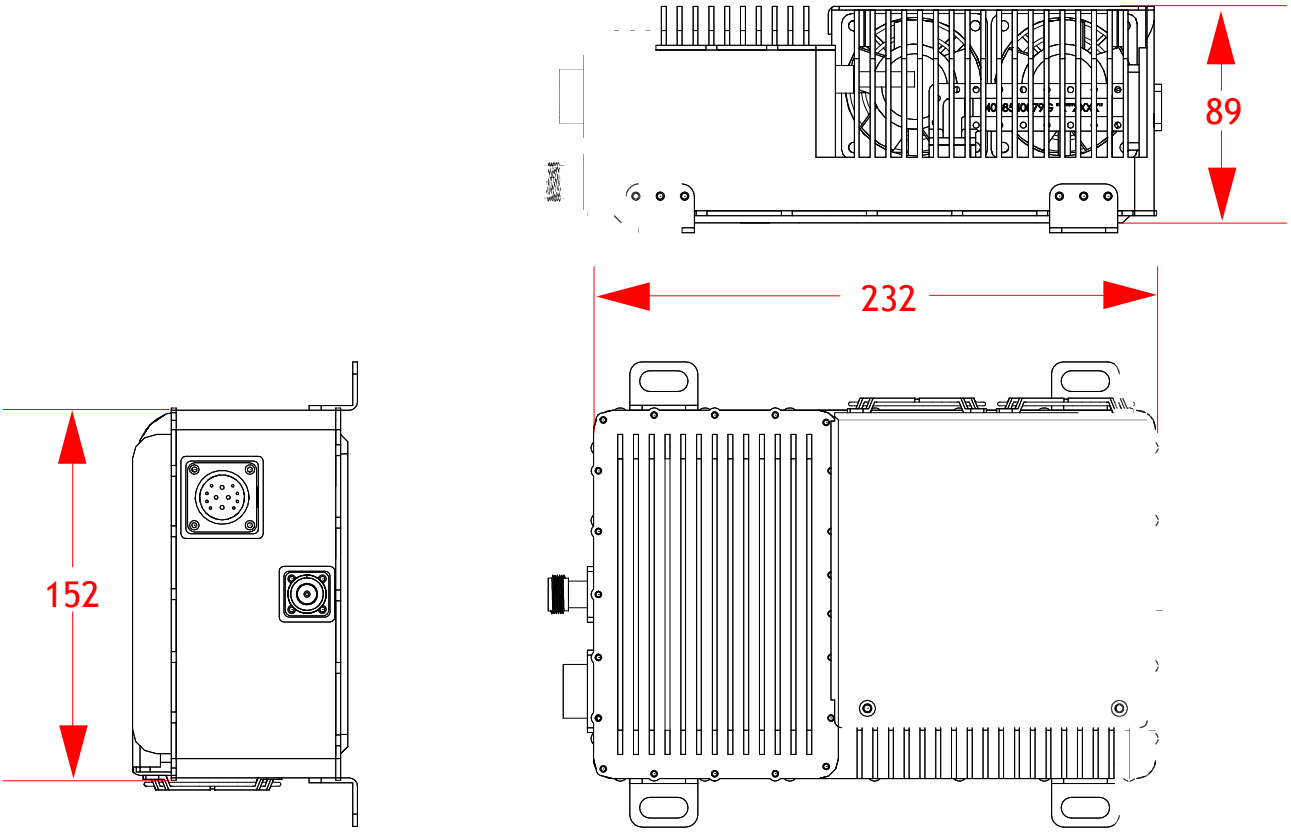

Figure B-2 8W Ka-BUC outline drawing

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Appendix C Compliance Standards

IEC 609501 – 2nd Edition	International Safety Standard for Information Technology Equipment
ETSI EN 301 489-12	Electromagnetic Compatibility and Radio Spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) Standard for radio equipment and services; Part 12: Specific conditions for Very Small Aperture Terminal, Satellite Interactive Earth Stations operated in the frequency ranges between 4 GHz and 30 GHz in the fixed Satellite Service (FSS)
ETSI EN 301 489-1	Electromagnetic Compatibility and Radio Spectrum Matters (ERM); ElectroMagnetic Compatibility Standard for Radio Equipment and Services
FCC Part 15 Class B	Two levels of radiation and conducted emissions limits for unintentional radiators (FCC Mark)

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Appendix D Document Revision Log

Revision	Date	Description
A	January 2013	Initial Release
B	October 2013	Added information about the 5W Ka-BUC.
	January 2014	Updated information about Transmit Frequency Bands for 5W Ka-BUC.

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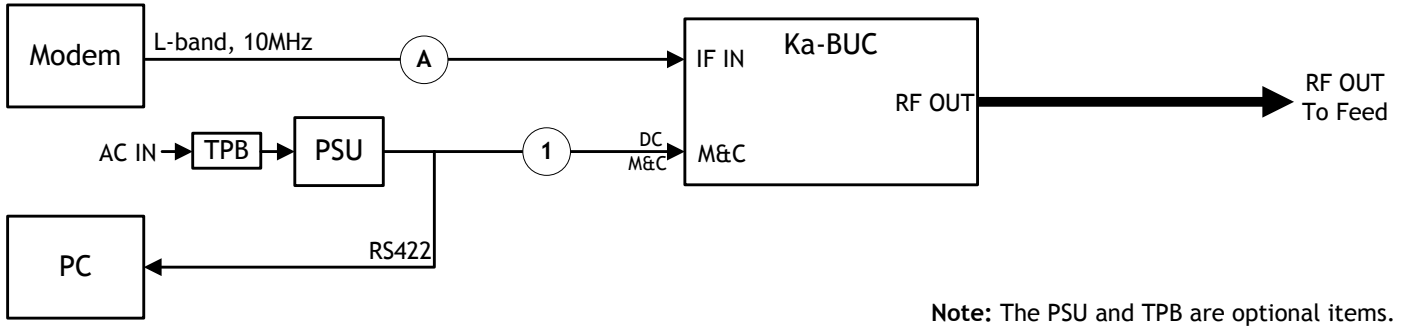
4W – 8W Ka-Band BUC Stand Alone System Configuration



Note: The PSU and TPB are optional items.

LIST OF ACCESSORIES

Item No.	Agilis Part No.	Description	Length (m)	Quantity
1	2502041458	C/A S/PLUG 14-12S TO M&C DB9 & DC OPEN	-	1
A		RF Cable (L-Band)	To be arranged by the customer	
-	6401240110	O-RING SILICON ID 10.5mm X 1.8mm	-	1
-	6302300310	SCRW HEX SCKT HD SS M3 x 10mm	-	4
-	APSVAC48-X00	AC-DC Power Supply Unit	-	-
-	1001520980	AC power cable with TPB	2	-
-	IM02960202	Installation and Operation Manual	-	1

LIST OF SYSTEM COMPONENTS

Item No.	Agilis Part No.	Description	Quantity
-	ALB110XXXXX	Ka-Band BUC	1

Note: These tables list the typical accessories for this setup. Depending on your purchase order, your BUC package may not include certain optional items. Please contact Agilis if you wish to purchase any of the accessories.